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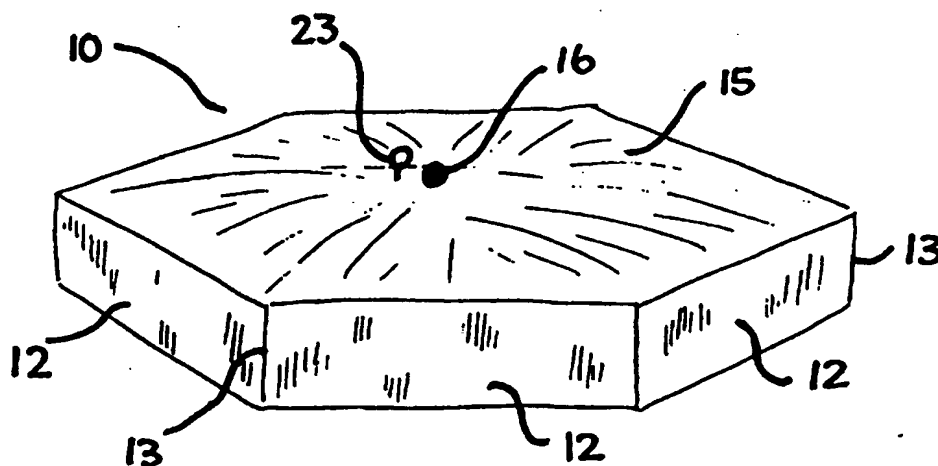
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963888 17 September 1996 (17.09.96) NO(71) Applicant (for all designated States except US): ROTHOR
A/S [NO/NO]; Arnstein Arnebergs vei 30, N-1324 Lysaker
(NO).

(72) Inventor; and

(75) Inventor/Applicant (for US only): THORESEN, Roar
[NO/NO]; Skuggevik, N-4790 Lillesand (NO).(74) Agent: MOSTUE, Roger; Bryns Patentkontor a/s, P.O. Box
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(54) Title: DEVICE FOR PREVENTING OF EVAPORATION OF WATER



(57) Abstract

A floating body for reducing water evaporation from a fresh water reservoir, characterised in that the body has a polygonal shape, where the side faces of the floating body have vertical walls with lateral edges which, when the body is afloat, are partly submerged in water, the body comprises further a gently arched top cover, buoyancy means and a hole in the top cover for air exchange.

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DEVICE FOR PREVENTING OF EVAPORATION OF WATER

The present invention relates to a device for reducing water evaporation. To be more precise, it relates to a system consisting of a number of identical units which are placed
5 on the surface of the water so as to prevent the evaporation of valuable fresh water. The device is especially intended to be used in countries with a hot climate where substantial evaporation is a particularly common phenomenon.

Today, fresh water is a limited resource in many parts of the world, and disagreements
10 about water are often an underlying cause of conflicts and wars between countries and communities in many parts of the world. The situation is expected to worsen as population growth and the demand for greater comfort increase. Of the amount of water "produced" by nature, i.e., precipitation which falls on land, it is anticipated that all will be used by the year 2010. Consequently, additional production of fresh water must take
15 place with the consumption of vast quantities of energy, and as consequence the price of water will see a sharp rise.

Today, water reservoirs are built in all countries that have a hot climate. Considerable water evaporation takes place from these reservoirs. It is not uncommon for water
20 volumes of from 15% to 30% of the contents of the reservoir to evaporate in the course of one year. Attempts have been made to prevent this undesirable evaporation by covering the water surface in the reservoirs, but this has proven difficult as any covering may entail practical problems in connection with precipitation and the effects of the wind. It is also labour-intensive and expensive to lay a canvas or the like on the surface.

25 EP 123 743 describes a floating element, the purpose of which is to heat the underlying water. To this end, sun rays are allowed to pass through the translucent walls of the elements. The medium (water or air) inside the floating element is thus heated, and in turn heats the water below. The object of this patent is to raise the temperature of the
30 water in order thereby to increase the productive capacity of algae, plankton, fish and so forth. This takes place in that the element creates different heat traps. Thus, EP 123 743 solves problems entirely different from those solved by the floating body of the present invention.

35 The intention of the present invention is to solve the problems of evaporation from water reservoirs. The invention relates to a floating body which is made of a UV-resistant, sun-reflecting material. The floating body is so designed that it is inexpensive

to produce, simple to place on the water, allows precipitation to run between the elements and is unaffected by the forces of wind.

These advantages can be obtained with the device of the invention in that polygonal, preferably hexagonal, bodies having vertical, smooth side faces and lateral edges are placed on the surface of the water in a great number. These polygonal bodies will float on the surface of the water, and because of their shape will create an almost closed cover. As a consequence of this covering the evaporation of water will be reduced considerably.

10

The invention will now be explained in more detail with reference to the drawings, wherein:

- | | |
|----------|--|
| Figure 1 | shows the hexagonal body; |
| 15 | |
| Figure 2 | shows a section through the floating body; |
| | |
| Figure 3 | is a detailed drawing of the floating body with one or more structural sections in order to reinforce the cover; |
| 20 | |
| Figure 4 | shows an alternative embodiment having legs which meet at one point; |
| | |
| Figure 5 | shows an alternative embodiment having downwardly directed legs; |
| 25 | |
| Figure 6 | shows the floating bodies laid out on a body of water, where the floating bodies form a honeycomb design and cover parts of the body of water. |

30

Figure 1 shows a hexagonal floating body (10) as it rests on the water. The body has six straight side faces (12) which are connected to each other in the lateral edges (13). A top cover (15) is provided on the top of the side faces so that top and sides form a closed unit. The top cover (15) has a gently convex arch form, so that precipitation runs off the cover more easily and over the sides into the water. In the top cover at the highest point a hole (16) is made to allow air to flow more easily in and out of the floating body (10)

35

when differences in pressure and temperature arise. The entire floating body, i.e., top cover (15) and side faces (13) will preferably be moulded as a single unit, and is made of a UV-resistant, hard-wearing, robust plastic. The area of the floating body may vary depending upon the external demands such as weather, wind and size of the water reservoir that is to be covered. A practical and favourable size with a view to production may be from 1 to 1.5 sqm. The lateral edges and side faces may be 0.25 m. To ensure that the cover affords maximum sun reflection a suitable colour is selected which is either mixed into the plastic during moulding or is applied as paint to the finished product.

10

Figure 2 shows a section through the floating body (10), with a detailed section of a part of the side face (12). In the upper part of the side face a compartment (18) is formed, which, e.g., may be triangular as shown in the figure. The compartment extends around the whole floating body and ensures uniform buoyancy. This compartment (18) may be filled with air, gas or another floatable substance which provides buoyancy. The figure shows the floating body in relation to the surface (17) of the water.

15

Figure 3 shows a detail of a corner of the floating body wherein a reinforcing structural section (19) has been affixed. The floating body may be equipped with several reinforcing structural sections extending from the side faces (12) and secured around the hole (16) in the centre of the top cover (15).

20

Figure 4 shows an alternative embodiment wherein from the lower end of the lateral edges (13) there are connected long support legs which extend down into the water and meet at a vertex (21). This embodiment with support legs may conceivably be used in areas where strong winds and bad weather prevail, where there is a danger that the floating bodies might be blown on top of one another. These support legs (20) will ensure that in heavy waves the floating bodies will more easily fall into place side by side, and in this way prevent the bodies from lying on top of one another.

30

Figure 5 shows an alternative wherein short support legs (22) are used. Here too, arched support legs are conceivable, as are support legs which run vertically down into the water. The function of all these support legs is to prevent the floating bodies from lying on top of one another.

35

An essential feature of the floating body of the invention is the compartment (18) filled with gas or another floatable substance providing buoyancy, whilst the lower part of the

side faces (12) is submerged in the water. This results in the floating body (10) being difficult to move and displace owing to the water volume that the side faces draw with them in the event of displacement. This will provide a calm, stabilising, steady floating effect, where strong wind and waves would be needed to blow the floating bodies onto one another. In such areas exposed to the elements the floating bodies can, if necessary, be equipped with support legs (20, 22) as described above.

Although the invention has primarily been explained with reference to a hexagonal floating body, the invention comprises polygons in general. The hexagon is considered to be the most suitable as the shape will be optimal with regards to positioning of the various floating bodies side by side on the surface of the water in a honeycomb pattern. The selection of triangular or rectangular floating bodies, will allow "openings" to form more easily in the cover. Nor will heptagons and octagons provide a closed cover, but they may be suitable where it is desirable for a part of the surface of the water to remain uncovered. This may be relevant where, e.g., it is desirable to allow more sunlight to pass into the water, as a water reservoir covered with floating bodies will receive relatively little light.

To facilitate boat transport it may be appropriate to provide fastening means (23) on the top cover (15) of the floating bodies (10). These fastening means may, for example, be an eyebolt if the purpose is to facilitate the tying together of several floating bodies (10) with rope to enforce a limitation of the covering of the surface. In this way a channel or passage for boat traffic can be produced.

P a t e n t c l a i m s

1.

A floating body for reducing water evaporation from a fresh water reservoir,
5 characterised in that the body (10) has a polygonal shape, where the side faces (12) of the floating body (10) have vertical walls with lateral edges (13) which, when the body is afloat, are partly submerged in water, the body comprises further a gently arched top cover (15), buoyancy means (18) and a hole (16) in the top cover for air exchange.

10 2.

A floating body according to Claim 1, characterised in that the floating body (10) is a hexagon.

3.

15 A floating body according to Claims 1-2, characterised in that the body (10) is moulded in a single piece in one operation.

4.

A floating body according to Claims 1-3, characterised in that the body (10) is made of
20 a UV-resistant, sun-reflecting plastic material.

5.

A floating body according to any one of the preceding claims, characterised in that the buoyancy means (18) are located on the inside of the side faces (12) and extend
25 around the whole of or part of the body (10) under the cover (15).

6.

A floating body according to any one of the preceding claims, characterised in that the buoyancy means (18) may be a compartment filled with air, or a foam material
30 which provides buoyancy.

7.

A floating body according to any one of the preceding claims, characterised in that a fastening device (23), preferably an eyebolt, is provided on the top cover (15).

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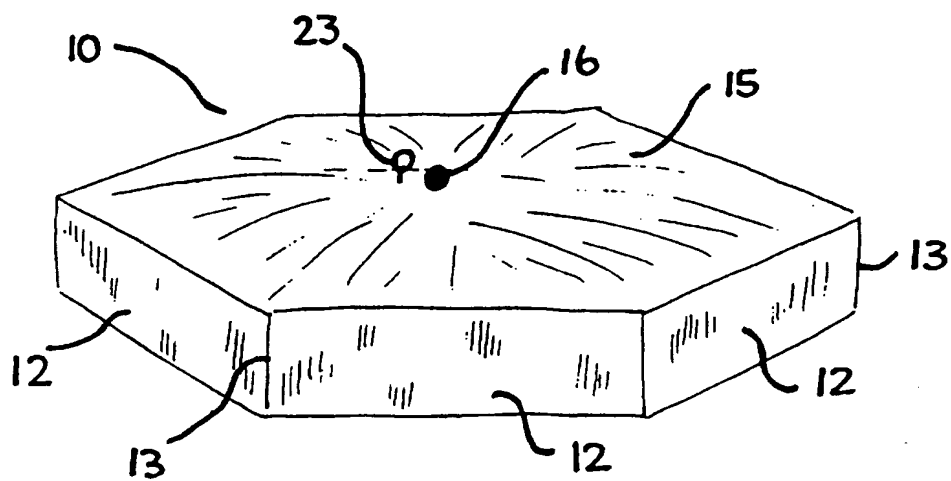
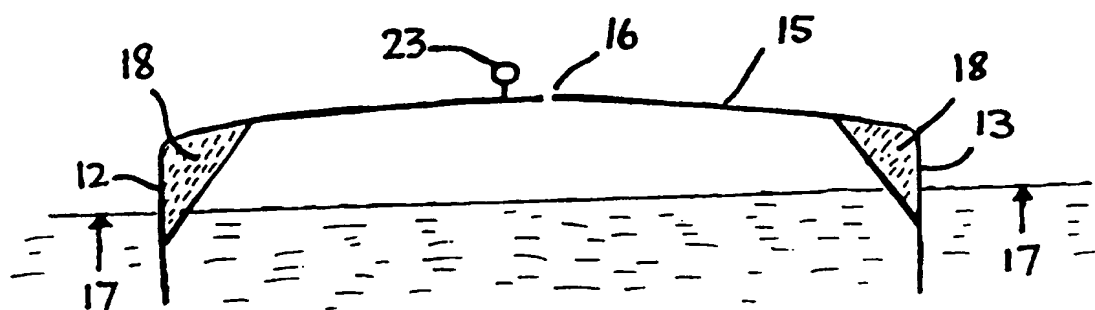
8.

A floating body according to any one of the preceding claims, characterised in that the top cover (15) is convexly arched.

5 9.

A floating body according to any one of the preceding claims, characterised in that the body is provided with short or long support legs (20, 22) which extend downwards from the side edges (13) of the body (10).

10

**Fig. 1****Fig. 2**

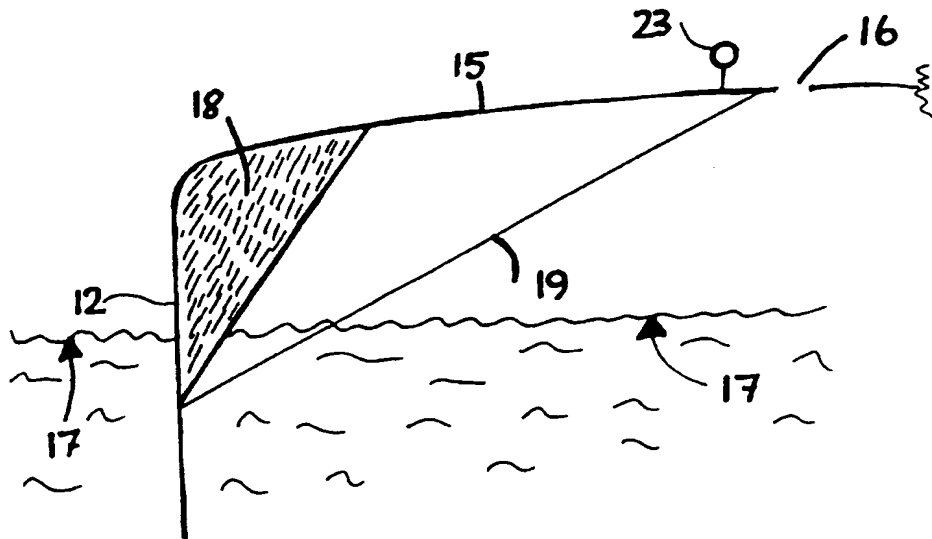


Fig.3

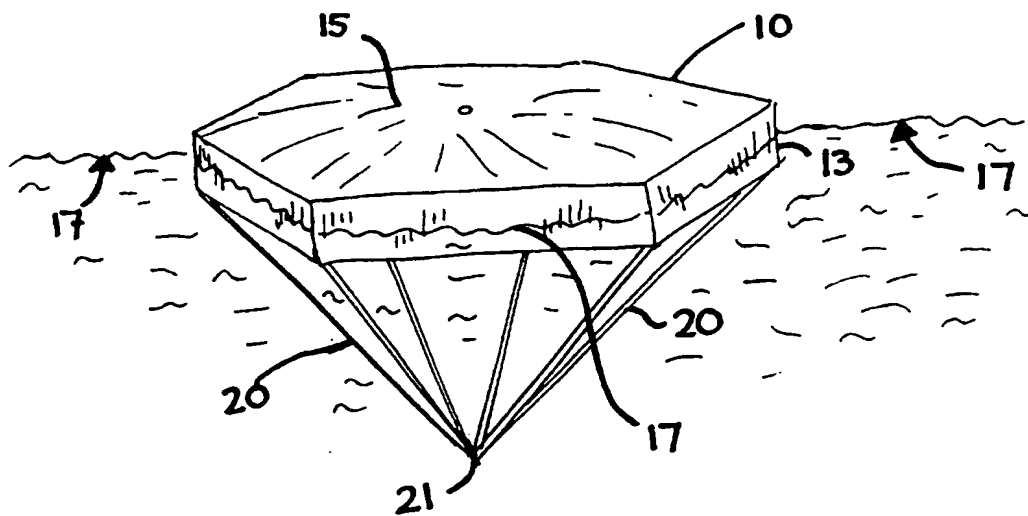
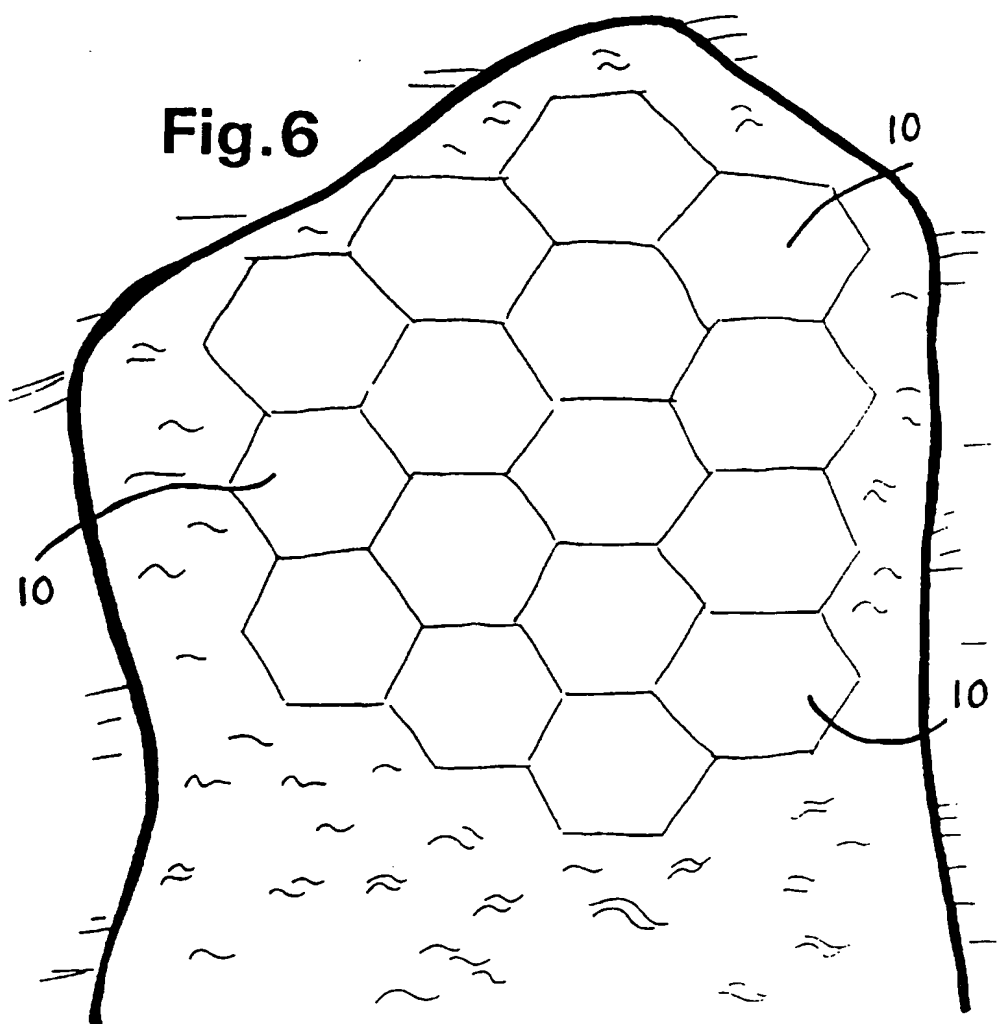
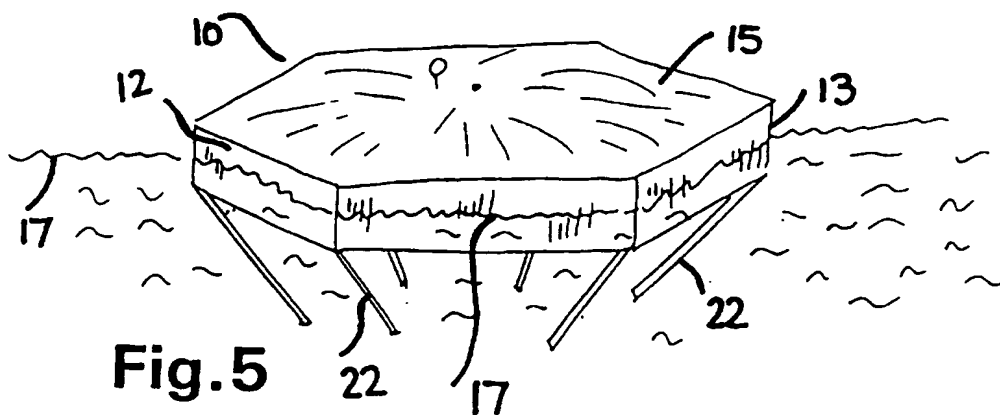


Fig.4



INTERNATIONAL SEARCH REPORT

International application No.

PCT/NO 97/00246

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: E03B 11/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: E03B, B65D, E04H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 1547076 A (ANTHONY MARSHALL BEAR), 6 June 1979 (06.06.79), page 1, line 11 - line 23; page 1, line 76 - page 2, line 6, figures 1,3-5 --	1-9
X	DE 3530727 A1 (T.M.T. TECHNOLOGIE- IND MANAGEMENT-TRANSFER GMBH), 5 March 1987 (05.03.87), column 1, line 63 - line 68, claims 1-2,6-10 --	1-9
X	US 3517513 A (C. RENSHAW ET AL), 30 June 1970 (30.06.70), column 2, line 63 - line 70 --	1-9
X	US 4735524 A (K.R. DUNKERS), 5 April 1988 (05.04.88), column 3, line 17 - line 22 --	1-9

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Name and mailing address of the ISA/

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Box 5055, S-102 42 STOCKHOLM

Facsimile No. +46 8 666 02 86

Authorized officer

Tommy Blomberg

Telephone No. +46 8 782 25 00

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4270232 A (R.D. BALLEW), 2 June 1981 (02.06.81), column 1, line 27 - line 29, abstract --	1-9
A	US 5398349 A (G. HABERLER), 21 March 1995 (21.03.95), abstract --	1-9
A	US 5074427 A (B.F.A. SIEMERINK ET AL), 24 December 1991 (24.12.91), column 2, line 47 - line 51, abstract -- -----	1-9

INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report			Publication date	Patent family member(s)	Publication date
GB	1547076	A	06/06/79	NONE	
DE	3530727	A1	05/03/87	NONE	
US	3517513	A	30/06/70	NONE	
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US	4270232	A	02/06/81	NONE	
US	5398349	A	21/03/95	CA 2133929 A	21/04/95
US	5074427	A	24/12/91	EP 0410528 A	30/01/91
				NL 8901913 A	18/02/91